

Publication

Abstractions for Planning with State-Dependent Action Costs

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Extending the classical planning formalism with state-dependent action costs (SDAC) allows an up to exponentially more compact task encoding. Recent work proposed to use edge-valued multi-valued decision diagrams (EVMDDs) to represent cost functions, which allows to automatically detect and exhibit structure in cost functions and to make heuristic estimators accurately reflect SDAC. However, so far only the inadmissible additive heuristic has been considered in this context. In this paper, we define informative admissible abstraction heuristics which enable optimal planning with SDAC. We discuss how abstract cost values can be extracted from EVMDDs that represent concrete cost functions without adjusting them to the selected abstraction. Our theoretical analysis shows that this is efficiently possible for abstractions that are Cartesian or coarser. We adapt the counterexample-guided abstraction refinement approach to derive such abstractions. An empirical evaluation of the resulting heuristic shows that highly accurate values can be computed quickly.

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